इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 9187-1 (1979): Deflection coil units used with TV picture tubes, Part 1: General requirements and tests(LTD 8) [LITD 5: Semiconductor and Other Electronic Components and Devices]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 9187 (Part 1) - 1979

Indian Standard
SPECIFICATION FOR DEFLECTION COIL UNITS USED WITH TV PICTURE TUBES
PART 1 GENERAL REQUIREMENTS AND TESTS

UDC 621·397 331 24 : 621·318·1·042·12

© *Copyright* 1979

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1979

AMENDMENT NO. 1 APRIL 1990
TO
IS 9187 (Part 1) : 1979 SPECIFICATION FOR DEFLECTION COIL UNITS USED WITH TV PICTURE TUBES
PART 1 GENERAL REQUIREMENTS AND TESTS

(*Page* 12, *clause* 7.4.6, *Note*) — Substitute the following for the existing Note:

'NOTE - This test shall be carried out without correction magnets in cases where the correction magnets are not permanently fixed on the deflection coil.'

(LTD 8)

Reprography Unit, BIS, New Delhi

IS : 9187 (Part I) - 1979

Indian Standard

SPECIFICATION FOR DEFLECTION COIL UNITS USED WITH TV PICTURE TUBES

PART I GENERAL REQUIREMENTS AND TESTS

Transformers and Inductors for Electronic Equipment Sectional Committee, LTDC 8

Chairman	*Representing*
SHRI C. K. SRINEEVAS	Bharat Electronics Ltd, Bangalore
Members	
SHRI R. P BAHETI	Electronics Corporation of India Ltd, Hyderabad
SHRI B. S. RAO (*Alternate*)	
SHRI J. P. BHARGAVA	National Research Development Corporation of India, New Delhi
SHRI M. P. BHATNAGAR (*Alternate*)	
SHRI G. V. DESAI	Electronic Component Industries Association, New Delhi
SHRI M. DAYAL (*Alternate*)	
DIRECTOR	Posts and Telegraphs, New Delhi
SHRI B. P. GHOSH	National Test House, Calcutta
SHRI A. DASGUPTA	Philips India Ltd, Bombay
SHRI V. M. BAPAT (*Alternate*)	
SHRI R. K. JAIN	Radio Electronic & Television Manufacturers Association (RETMA), Bombay
SHRI T. J DHABHAR (*Alternate*)	
KUMARI K. R. JAYA	Indian Telephone Industries Ltd, Bangalore
SHRI T. G. VASUDEVAN (*Alternate*)	
SHRI S. KRISHNAMURTHY	Railway Board (Ministry of Railways), New Delhi
SHRI JAYARAMAN (*Alternate*)	
SHRI B. MAJUMDAR	The Development Commissioner, Small Scale Industries, New Delhi
SHRI S NEELAKANTAN	Ministry of Defence (R & D)
SHRI P. K. RAO	Ministry of Defence (DGI)
SHRI S. N. MOHAMMED (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1979

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
Shri M. Sankaralingam	Directorate General of Supplies & Disposals, New Delhi
Shri D. R. Chandran (*Alternate*)	
Shri P R. Suryanandan	Office of the Director of Civil Aviation, New Delhi
Shri Vishwanath (*Alternate*)	
Shri P. Suryanarayan	National Physical Laboratory (CSIR), New Delhi
Shri R. C. Jain, Head (Electronics)	Director General, ISI (*Ex-officio Member*)

Secretary

Shri B. K. Sharma

Assistant Director (Electronics), ISI

Indian Standard
SPECIFICATION FOR DEFLECTION COIL UNITS USED WITH TV PICTURE TUBES

PART I GENERAL REQUIREMENTS AND TESTS

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 15 May 1979, after the draft finalized by the Transformers and Inductors for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The object of this standard is to establish uniform requirements for the electrical, mechanical and climatic properties and test methods for deflection coil units used with TV picture tubes.

0.3 It is recognized that in the case of components like deflection coil units, complete understanding of the requirements of the particular equipment is possible only if the indenting user gives details of all requirements. A list of such items for which the purchaser should furnish the information at the time of enquiry or order, has been included in Appendix A.

0.4 The operation may require the use of NTC resistors and cover correction magnets to realise performance specification requirements if so called for in the design.

0.5 This standard is largely based on JSS 54650 ' General requirements for tube deflecting and tube focusing coils ' issued by the Directorate of Standardization, Department of Defence Production, Ministry of Defence, New Delhi.

0.6 This standard requires reference to IS : 589-1961* as far as the details of the climatic and mechanical testing procedures are concerned. Only the relevant degrees of severity have been specified in this standard.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960†.

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†Rules for rounding off numerical values (*revised*).

The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part I) relates to general requirements and methods of test for judging the mechanical, electrical and environmental properties of deflection coil units used in conjunction with TV picture tubes for magnetic deflection.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Routine Tests — Tests carried out on each deflection coil unit to check the requirements which are likely to vary during production.

2.2 Acceptance Tests — Tests carried out on deflection coil units selected from a lot which has passed the routine tests for the purpose of acceptance of the lot.

2.2.1 *Lot* — All deflection coil units of the same type, category and ratings, manufactured by the same factory during the same period, using the same process and materials.

2.3 Type Tests — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general qualities and design of a particular type of deflection coil units.

2.4 Type — A type comprises of products having similar functions, manufactured by the same techniques and falling within the manufacturer's usual range of ratings for these products.

NOTE 1 — Mounting accessories are ignored, providing they have no significant effect on the test results

NOTE 2 — Rating cover the combination of·

a) electrical ratings (*see* the relevant parts dealing with individual types of deflection coil unit),

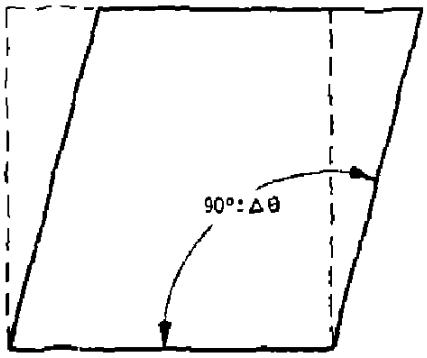
b) sizes, and

c) environmental group.

2.5 Deflection Factor — The current required to produce unit angular deflection, on the screen of TV picture tube. It is the reciprocal of deflection sensitivity.

2.6 Deflection Sensitivity — Amount of electron beam deflection per milliampere of current caused to flow through the coil windings when the specified accelerating voltage is applied.

2.7 Perpendicularity/Trapezium — The maximum allowable deviation from a 90-degree angle on a raster (*see* Fig. 1).



Δ θ — Maximum allowable deviation.

Fig. 1 Example of Perpendicularity

2.8 Pin-Cushion Distortion — A pattern distortion that causes concave sides to appear on a symmetrically disposed rectangle (*see also* **7.4.6**).

2.9 Barrel Distortion — A pattern distortion that causes convex sides to appear on a symmetrically disposed rectangle (*see also* **7.4.6**).

2.10 Sweep Straightness — The maximum allowable deviation from a straight line when one of the coils is operating with the specified sweep voltages across its terminals with the TV picture tube specified and the other coil (inactive) having a specified termination (normal leading).

Note — The deflection coil unit consists of two coils their magnetic axes being on right angle to each other.

3. TYPE DESIGNATION

3.1 The type designation used shall be abbreviations to identify a particular type of deflection coil unit and shall comprise of the following as given in the example.

Example:

DCU 1S

DCU denotes deflection coil unit;

1 represents TV tube of sizes 470 mm, 510 mm, 590 mm and 610 mm; and

S denotes solid state circuitry.

3.2 The type designation of a particular deflection coil unit shall be specified in the relevant specification.

4. CLIMATIC SEVERITY

4.1 The deflection coil unit for TV picture tube shall be subjected to the following climatic severity:

Climatic Test (*see* IS : 589-1961*)	*Severity*
Dry heat	+ 70°C
Cold	− 10°C
Damp heat (long term)	21 days
Damp heat (accelerated)	2 cycles
Low air pressure	60 kPa

NOTE — Higher severity may be specified if so required for any specific application in the relevant specification.

5. MATERIALS, CONSTRUCTION AND WORKMANSHIP

5.1 Materials — The deflection coil units shall be constructed from materials free from flaws and other defects. As far as practicable, materials used for construction shall be flame retardant, nonexplosive, and shall not absorb moisture.

5.2 Terminations — Deflection coil units shall be provided with screw, lug, tag, leads or plug-in lead type terminations.

NOTE — Lugs, if used, shall be secured in such a way that they do not rotate or work loose or break away in normal use.

5.3 Screw, Nuts and Washers — All screws, nuts and washers, including lock washers shall be of standard sizes and threads [*see* IS : 4218 (Parts I to VI)-1967†] and of corrosion resistance material.

5.4 Finish — All exposed metal parts such as edges of laminations brackets and other hardware shall be plated, painted or otherwise protected to prevent corrosion.

5.5 Workmanship — All parts of the deflection coil units shall be manufactured in a thoroughly workman like manner and in accordance with good engineering practice.

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†ISO metric screw threads.

6. MARKING

6.1 Each deflection coil unit shall be marked with the following minimum information:

a) Type designation and manufacturer's name or trade-mark,
b) Manufacturer's code or batch number, and
c) Terminal identification.

6.2 In all cases the carton shall carry the following minimum information:

a) Type designation and manufacturer's name or trade-mark;
b) Manufacturer's code or batch number; and
c) The name of the component, namely, deflection coil unit.

6.3 Data sheet giving the following minimum information shall be supplied:

a) Winding/terminal identification and schematic diagram;
b) Ratings, namely, inductance, dc resistance, horizontal and vertical trapezium; and
c) Other performance ratings.

6.4 The markings shall be such as not to become illegible while in storage and during service through normal handling.

6.5 Any additional marking shall be so applied that no confusion may arise.

6.6 The deflection coil units may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control which is deviced and supervised by ISI and operated by the producer ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

7. TESTS

7.1 General Conditions for Tests

7.1.1 *General* — Tests shall be carried out on the deflection coil units as received from the manufacturer or the supplier.

7.1.2 *Atmospheric Conditions for Testing* — Unless otherwise specified, all tests shall be carried out under standard atmospheric conditions specified in IS : 589-1961*.

7.1.3 *Preconditioning* — Before measurements are made the deflection coil units shall be stored at the measuring temperature and relative humidity for a time sufficient to allow the entire deflection coil unit to reach these conditions. The recovery period called for after conditioning is adequate for this purpose.

7.1.4 *Correction to be Applied* — When measurements are made at an ambient temperature other than the reference temperature, the results shall, where necessary, be corrected to the reference temperature. The ambient temperature during the test shall be stated in the test report.

7.1.5 *Other Precautions* — During measurements the deflection coil units shall not be exposed to draughts, direct sun-rays or other influences likely to cause errors.

7.1.6 *Test Frequency* — When a test frequency is specified with no tolerance, the frequency used shall be within 1 percent of the specified value.

7.1.7 *Test Voltage* — The test voltage shall be sufficiently free of distortion and noise to such a degree as not to produce any false or spurious indications.

7.2 Classification of Tests

7.2.1 *Type Tests* — The procedure for type approval shall be in accordance with IS : 2612-1965†.

a) *Number of samples* — The number of samples for type tests shall be 12 of same code number unless otherwise stated in the relevant specification.

b) *Sequence of type tests* — The sequence of type tests shall be in accordance with Table 1 unless otherwise specified in the relevant specification.

7.2.2 *Routine Tests* — The routine tests shall be performed in the following orders:

Test	*Clause Number*
Visual examination	7.3.1
DC resistance	7.4.3
Inductance	7.4.4
Voltage-proof	7.4.7
Insulation resistance	7.4.8

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†Recommendation for type approval and sampling procedures for electronic components.

TABLE 1 TYPE TESTS

(*Clause* 7.2.1)

GROUP	NUMBER OF SPECIMEN	TESTS	CLAUSE NUMBER
(1)	(2)	(3)	(4)
0	All	Visual examination	7.3.1
		Dimensions	7.3.2
		Continuity of winding	7.4.2
		DC resistance	7.4.3
		Inductance	7.4.4
		Operating current and voltage	7.4.1
		Voltage-proof	7.4.7
		Insulation resistance	7.4.8
		Deflection sensitivity (with accelerating voltage)	7.4.5
		Distortion (pin cushion, barrel effect and perpendicularity/trapezium)	7.4.6
1	3	Soldering	7.6
		Robustness of terminations	7.7
		Bump (when specified)	7.8
		Vibration (when specified)	7.9
		Shock (when specified)	7.14
		Acceleration (when specified)	7.15
		Climatic	7.10
2	3	Damp heat (long term exposure)	7.11
3	3	Endurance (electrical) (when specified)	7.16
		Flammability	7.17
4	1	Mould growth	7.12
5	1	Temperature rise	7.5
6	1	Salt mist	7.13

7.2.2.1 If during routine tests more than 10 percent of the lot fails, the entire lot may be rejected.

7.2.3 *Acceptance Tests* — The acceptance tests shall be carried out on a limited number of samples selected in accordance with the sampling procedure given in IS : 2612-1965* from a lot which has passed the routine tests as specified in **6.2.2**.

Two groups of samples shall be selected and each group shall be subjected to the tests specified in the order in Table 2 unless otherwise specified in the individual relevant specification.

TABLE 2 ACCEPTANCE TESTS

(*Clause* 7.2.3)

TEST	CLAUSE NUMBER	AQL* (PERCENT DEFECTIVE)	INSPECTION LEVEL	*D*/*N*†
(1)	(2)	(3)	(4)	(5)
GROUP A TEST				
Dimensions	7.3.2	4	II	*N*
Operating current and voltage	7.4.1			
Continuity of winding	7.4.2			
DC resistance	7.4.3			
Inductance	7.4.4			
Voltage-proof	7.4.7			
Insulation resistance	7.4.8			
Deflection sensitivity	7.4.5			
Distortion	7.4.6			
GROUP B TEST				
Robustness of termination	7.7	4	S3	*D*
Bump	7.8			
Climatic	7.10			
Visual examination	7.3.1			

*IS : 2500 (Part I)-1973 Inspection by attributes and by count of defects (*first revision*)

†*D* = Destructive ; *N* = Non-destructive.

7.3 General Tests

7.3.1 *Visual Examination* — The deflection coil units shall be visually for workmanship, finish, condition and marking and these shall be satisfactory.

---

*Recommendation for type approval and sampling procedures for electronic components.

7.3.2 *Dimensions* — The dimensions shall be checked for compliance with those specified in the relevant specification and as per manufacturers drawings wherein the requirements are not covered.

7.4 Electrical Tests

7.4.1 *Operating Current and Voltage* — Maximum operating current and voltage shall be applied to each coil winding as specified (*see* Appendix A).

Each winding shall be examined for evidence of shorts, grounds and sparking.

7.4.2 *Continuity of Winding* — Each winding of the deflection coil unit shall be tested for electrical continuity by any suitable method. Each winding shall be continuous.

7.4.3 *DC Resistance* — The dc resistance shall be measured with a resistance bridge or other suitable test equipment. The test current through the specimen shall be as small as practical considering the sensitivity of the indicating instruments, unless the current or voltage is specified. When it is important that the temperature of the specimen shall not rise appreciably during the measurement, the test voltage shall be applied uninterruptedly for as short a time as practicable, but in no case for more than 5 seconds, unless otherwise specified. The measurement shall be made at or corrected to 25°C.

The value shall be within the tolerance limits as specified.

7.4.4 *Inductance* — The winding, whose inductance is to be measured, is to be connected as shown in Fig. 2 with an external capacitor of value C_1 across it. The resonance frequency f_1 of the circuit is measured by varying the frequency of the *RF* signal generator for maximum deflection on the electronic voltmeter. The value of the external capacitor is changed to C_2 and the new resonance frequency f_2 is determined. The inductance L of the winding is then given by:

$$L = \frac{f_2^2 \sim f_1^2}{4\pi^2 f^2_1 f^2_2 \, (C_1 \sim C_2)}$$

7.4.5 *Deflection Sensitivity (with Accelerating Voltage)* — A standard pattern generator, receiver or monitor, oscilloscope, current probe and standard line output transformer capable of delivering the acceleration voltage specified shall be used.

The test deflection coil unit without the pin cushion correction magnets shall be mounted on the neck of the picture tube in such a way that it touches the cone of the tube as far as possible. All the relevant circuit connections to the horizontal and vertical coils shall be made to the deflection coil unit.

The receiver or monitor shall be switched on and the pattern shall be fed to its input. The brightness and contrast shall be kept moderately clear. If the pattern on the screen is eccentric this shall be corrected by means of the two independently movable centering magnets.

At the specified accelerating voltage and for the deviation specified, the peak to peak current flowing through the line deflection coil as well as the frame deflection coils shall be measured. These currents shall be within the limits specified.

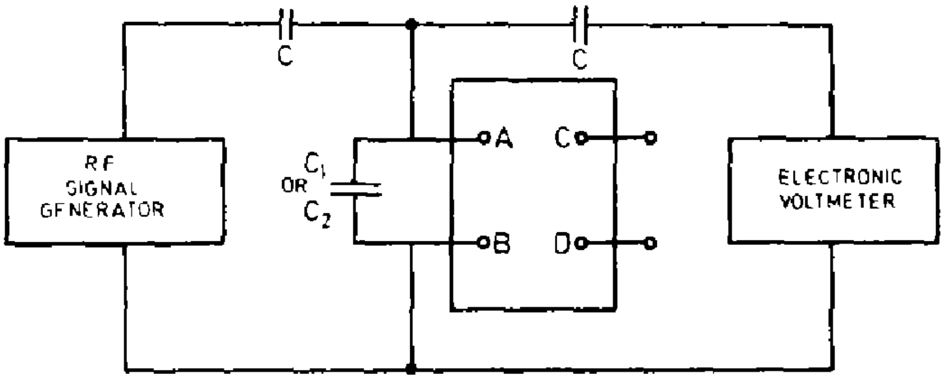


Fig. 2 Set-up for the Measurement of Inductance

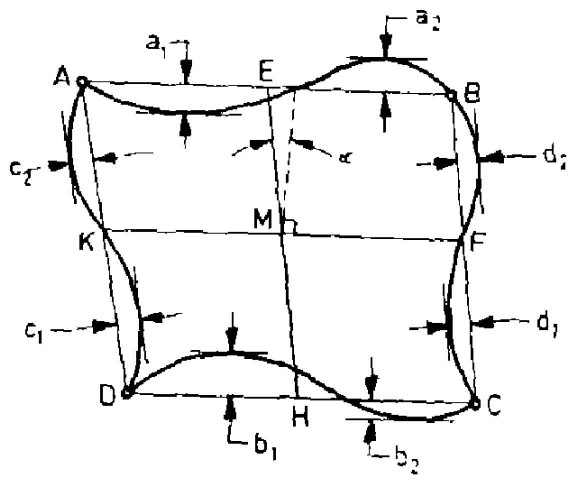
7.4.6 *Distortion (Pin Cushion, Barrel, Perpendicularity/Trapezium)* — An electrically generated test pattern may be used consisting of a system of narrow horizontal and vertical bars both equidistant in time dividing the picture area into elementary areas of approximately square shape.

A transparent sheet such as a photographic film with 2 concentric rectangles and two cross lines bisecting the rectangles and mutually perpendicular to their sides is used.

The size of the two rectangles shall be as specified in the component specification. This transparent sheet shall be overlayed on the picture tube and centered with respect to the tube face with the help of the pattern trace projected and is fixed in position.

The distorted contour of the largest completely visible rectangle formed by the test pattern and having approximately the correct aspect ratio is traced on the transparent. The picture outline distortion values may be computed with the formula given in Fig. 3.

Note — This test shall be carried out without correction magnets.



Horizontal pin cushion distortion $= 2 \times \dfrac{a_1 + b_1}{AD + BC} \times 100$

Vertical pin cushion distortion $= 2 \times \dfrac{c_1 + d_1}{AB + CD} \times 100$

Horizontal trapezium distortion $= \dfrac{AD - BC}{AD + BC} \times 100$

Vertical trapezium distortion $= \dfrac{AB - DC}{AB + DC} \times 100$

Horizontal barrel distortion $= 2 \times \dfrac{a_2 + b_2}{AD + BC} \times 100$

Vertical barrel distortion $= 2 \times \dfrac{c_2 + d_2}{AB + CD}$

FIG. 3 DIAGRAM & FORMULAE FOR ASSESSING PICTURE OUTLINE DISTORTION VALUES

7.4.7 *Voltage-Proof* — Unless otherwise specified, the deflection coil unit shall withstand without breakdown the application of an ac test voltage of value shown as under:

Maximum Working Voltage V	*Test Voltage* V
25 and below	50
Over 25 up to 50	100
Over 50 up to 100	300
Over 100 up to 175	500
Over 175 up to 700	2·8 × Maximum working voltage
Over 700 and above	1·4 × Maximum working voltage + 1 000

Specimens shall be mounted by normal means. The test voltage shall be applied between windings and the case, if any. The voltage shall be raised at a rate not exceeding 500 V per second and shall be maintained at the maximum value for 1 minute. All windings not under test shall be connected to the case.

When this test is carried out as a routine test, the voltage shall be applied for 5 seconds only. The maximum peak voltage between terminals of line and field coils at 50 Hz shall be 2 500 volts.

7.4.8 *Insulation Resistance* — Unless otherwise specified, the insulation resistance shall be measured by applying dc test voltages as mentioned below for one minute ± 5 seconds between the case and each winding and also between windings, if applicable. The voltage shall not be applied gradually but shall be applied immediately through the internal resistance of the test apparatus. The insulation resistance shall be read after one minute ± 5 seconds.

Maximum Working Voltage V	*Test Voltage* V
25 and below	50
over 25 up to 175	100
above 175	500

The insulation resistance shall not be less than 1 000 Mohms.

7.5 Temperature Rise — This test shall be carried out at a temperature not exceeding the upper category temperature. The deflection coil unit shall be mounted so as to be protected from draughts and shall not be subjected to radiations from warmer objects. The thermometer (which may be of thermocouple type) used for measuring the ambient temperature shall be protected against trivial temperature changes.

The deflection coil unit shall be mounted in the monitor unit. The deflection current shall be adjusted for 5 percent overscan. The dc resistance of the line and frame coils shall be measured before the test at tamb.

Temperature rise will be determined by resistance measuring within 10 seconds after switching off the deflection coil unit. Δt will be calculated from the formula:

$$\Delta t = \frac{R_2 - R_1}{R_1} = (234{\cdot}5 + t_1) - (t_2 - t_1)$$

where

Δt = temperature rise,
R_1 = the resistance at the beginning of the test,
R_2 = the resistance at the end of the test,

t_1 = room temperature at the beginning of the test in °C, and
t_2 = room temperature at the end of the test in °C.

NOTE 1 — At the beginning of the test the winding shall be at room temperature.

NOTE 2 — Δt is calculated as soon as a steady state has been reached The Δt shall not exceed the limit temperature given in the relevant specifications.

7.6 Soldering — Deflection coil units for TV picture tubes provided with lead type termination shall be subjected to solder bath test in accordance with **7.18.2** of IS : 589-1961*. The period of recovery after the immersion of the termination shall be 30 minutes, unless otherwise specified in the relevant specification.

At the end of the test, the deflection coil unit shall be visually examined. The deflection coil unit shall not show any loosening of connections, melting or seepage of fixing material or any other deterioration. The continuity of all the windings shall be checked.

7.7 Robustness of Termination

7.7.1 *Tensile Test on All Terminations* — All terminations shall be subjected to the test in accordance with **7.19.1** of IS : 589-1961*. The loading weight, the duration of the test and the number of bends shall be as specified in the relevant specification. In the case of the terminations, the tests shall be carried out in accordance with **7.19.2.3** of IS : 589-1961*.

7.8 Bump — The deflection coil unit shall be mounted as specified in **7.5.1.6** of IS : 589-1961*, taking care that the terminations are not stressed and that equal number of samples are bumped in each of the three principal axes. Samples shall be subjected to 1000 bumps unless otherwise specified. After the test, the deflection coil unit shall be visually examined and shall not show any damage or deterioration. The continuity of the winding, shall be checked.

7.9 Vibration — The deflection coil unit shall be mounted as required in **7.8** so that equal number of samples are vibrated along each of the three principal axes. The deflection coil unit shall be subjected to vibration (fatigue) test in accordance with **7.6.6** of IS : 589-1961*. The vibration severity should be 10 to 55 Hz with duration of six hours.

After the test, the deflection coil unit shall be visually examined and there shall not be any damage or deterioration. The continuity of the winding shall be checked. The dc resistance and inductance shall be measured and should be within specified limits. There shall be no change in insulation resistance when measured at the end of this test. Voltage-proof test shall also be carried out.

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

7.10 Climatic Tests

7.10.1 *Climatic Sequence*

7.10.2 *Dry Heat* — The deflection coil unit shall be subjected to the dry heat test in accordance with **7.2** of IS : 589-1961*. The temperature of the test chamber shall be maintained at the maximum category temperature of the deflection coil unit. The deflection coil unit shall be on full load during the exposure if specified in the relevant specification. While still at the high temperature and during the last half hour of exposure, the insulation resistance shall be measured and shall be not less than the value specified in the relevant specification.

After recovery, the deflection coil unit shall be visually examined for any damage or deterioration. The insulation resistance shall be measured as in **7.4.8** and it shall not deviate from the values obtained therein.

7.10.3 *Damp Heat (Accelerated)* (*First Cycle*) — The deflection coil unit shall be subjected to the first cycle of the damp heat (accelerated) test in accordance with **7.4** of IS : 589-1961*. The duration of the recovery period shall be one and a half hours. After recovery, the deflection coil unit shall be visually examined for any damage or deterioration.

The insulation resistance shall be measured and it shall not deviate from the values obtained therein.

7.10.4 *Cold Test* — The deflection coil unit shall be subjected to the cold test in accordance with **7.1** of IS : 589-1961*. The temperature of the chamber shall be maintained at the minimum category temperature. The duration of recovery period shall be one and a half hours. After recovery, the deflection coil unit shall be visually examined and there shall not be any damage or deterioration. The following tests shall be carried out:

a) Continuity of the winding, and

b) Voltage-proof.

7.10.5 *Air Pressure (Low)* — The deflection coil unit shall be subjected to low air pressure test in accordance with **7.12** of IS : 589-1961*. The pressure shall be appropriate to the category and the duration shall be 5 minutes.

During the period of exposure, a test voltage equal to 120 percent of the working voltage shall be applied between terminals of line and field coils.

There shall be no electrical failure or mechanical deterioration.

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

7.10.6 *Damp Heat* (*Accelerated*) (*Remaining Cycle*) — The deflection coil unit shall be subjected to the remaining number of cycles of damp heat (accelerated) in accordance with **7.4** of IS : 589-1961*. After the recovery of 24 hours the components shall be subjected to visual examination and the continuity of windings is tested. There shall be not any apparent damage or illegibility of markings and the windings shall be continuous.

The deflection coil units shall then be subjected to dc resistance, inductance, voltage-proof and insulation resistance tests. The values shall not be less than those specified in the relevant specification.

7.11 Damp Heat (Long Term Exposure) — The deflection coil units shall be subjected to the damp heat (long term exposure) test in accordance with **7.3** of IS : 589-1961*. The duration of the exposure shall be in accordance with the category of the component under test.

During the test, leading if required, shall be specified in the relevant specification. After recovery, the components shall be subjected to visual examination and the continuity of windings is tested. There shall not be any apparent damage. The markings shall be legible and the windings shall be continuous.

The components shall then be subjected to dc resistance, inductance, voltage-proof, and insulation resistance tests. The values shall not be less than those specified in the relevant specification.

7.12 Mould Growth — The deflection coil units shall be subjected to mould growth test in accordance with **7.9** of IS : 589-1961*. At the end of the test the deflection coil units shall be subjected to visual examination and the continuity off windings. There shall not be any apparent damage, the markings shall be legible and the windings shall be continuous.

7.13 Salt Mist — The deflection coil units shall be subjected to salt mist test in accordance with **7.10** of IS : 589-1961*. The duration of exposure shall be 4 days. After cleaning and recovery, the deflection coil units shall be subjected to a visual examination and the continuity of windings shall be tested. There shall be not any apparent damage, the markings shall be legible and the windings shall be continuous.

7.14 Shock — The deflection coil units shall be subjected to shock test in accordance with **7.5** of IS : 589-1961*. At the end of the test, the deflection coil unit shall be subjected to visual examination and the continuity of windings. There shall not be any apparent damage, the markings shall be legible and the windings shall be continuous.

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

The deflection coil units shall then be subjected to dc resistance, inductance, voltage-proof and insulation resistance tests. The values shall not be less than those specified in the relevant specification.

7.15 Acceleration — The deflection coil units shall be subjected to acceleration test in accordance with **7.7** of IS : 589-1961*. At the end of this test the deflection coil units shall be subjected to visual examination and the continuity of windings. There shall not be any apparent damage the markings shall be legible and windings shall be continuous.

The components shall then be subject to dc resistance, inductance, voltage-proof and insulation resistance tests. The values shall not be less than those specified in the relevant specification.

7.16 Endurance (Electrical) — The deflection coil units shall be mounted in accordance with detail specification. Each winding shall be loaded with its rated current. The test shall be carried out at the maximum category temperature and the duration of this test shall be 1 000 hours, unless otherwise specified.

At the end of 1000 hours period, the deflection coil units shall be allowed to cool under standard atmospheric conditions for testing. The deflection coil unit shall then be subjected to visual examination and continuity of windings. There shall not be any apparent damage, the markings shall be legible and the windings shall be continuous.

The deflection coil units shall further be subjected to dc resistance, inductance, voltage-proof and insulation resistance tests. The values shall not be less than those specified in the relevant specification.

7.17 Flammability — The test shall be carried out in accordance with the procedure given in Appendix B.

APPENDIX A

(*Clauses* 0.3 *and* 7.4.1)

INFORMATION TO BE GIVEN BY THE PURCHASER

A-1. The deflection coil unit for TV picture tubes covered by the standard is suitable for the television receivers designed for system B of CCIR that is monochrome vision reception for 625 lines and for negative modulation with the associated frequency modulated sound reception (*see* Appendix A of IS : 4545-1968†).

---

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†Methods of measurement on receivers for monochrome television broadcast transmissions.

A-2. At the time of order or enquiry, the purchaser of the deflection coil unit for TV picture tubes shall furnish information on the following items:

a) *TV Picture Tube Details* [*see* IS : 5840 (Part I)-1970*]:

1) Nick diameter of picture tube with which deflection coil unit is to be used namely 28 mm or 20 mm.
2) Angle of deflection namely 90° or 110° or 114°.
3) Screen diameter of picture tube with which deflection coil unit is to be used.

b) *Deflection Coil Unit Details*:

1) Mechanical data including dimensional drawings and mass.
2) Electrical data:
   i) Operating current and voltage,
   ii) DC resistance of frame and line coil,
   iii) Inductance of frame and line coil,
   iv) Insulation resistance,
   v) Deflection sensitivity,
   vi) Pin cushion distortion and barrel distortion, and
   vii) Maximum operating temperature.
3) Accessories required namely correction magnets, thermisters, linearity components, etc.
4) Flammability requirements.

APPENDIX B

(*Clause* 7.17)

FLAMMABILITY TEST

B-1. OBJECT

B-1.1 This test is intended to determine whether deflection coil units will support combustion.

B-2. TEST CHAMBER

B-2.1 The chamber used for this test shall have the following provisions:

a) An enclosure protected from air currents, but provided with means of venting fumes and admitting an adequate supply of fresh air at the bottom.

---

*Dimensions of cathode-ray tubes: Part I Tube outlines.

Note 1 — A metal box about 600 mm wide, 900 mm high and 600 mm deep, with a detachable front, a viewing window and suitable holes for intake of air and venting of fumes shall be used.

Note 2 — Adequate safety precautions shall be taken to protect personnel from possible explosion of the components.

b) A suitable stand or support for the deflection coil units involving a minimum of heat transfer; and

c) A spirit burner of the pattern shown in Fig. 4 or of any other pattern. The fuel for the burner shall be good quality 66° OP industrial methylated spirit containing not more than 5 percent of wood naptha (*see* IS : 324-1959*). The burner and the flame are considered satisfactory if a bare copper wire 0·71 mm dia having a free length of not less than 100 mm in the flame in the position to be occupied by resistor metals in less than 6 seconds.

Note — The melting point of copper is 1 083°C.

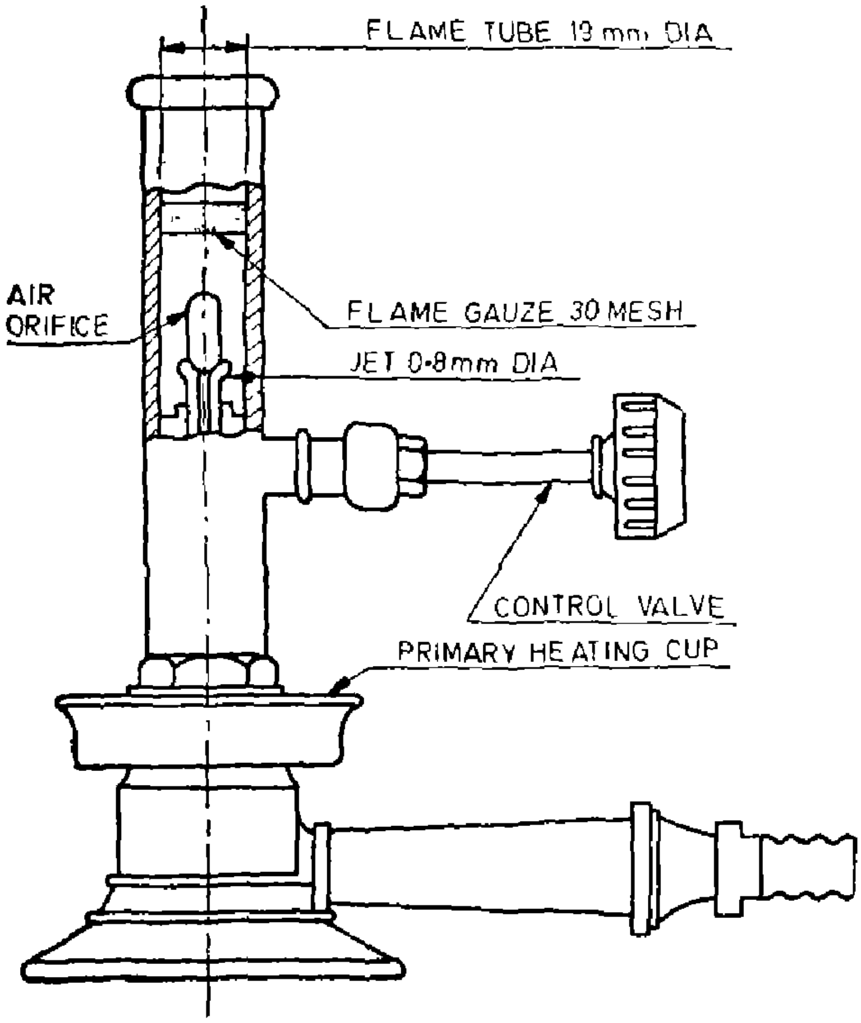


Fig. 4 Spirit Burner

---

*Specification for ordinary denatured spirit (*revised*).

B-3. MOUNTING

B-3.1 The deflection coil units shall be mounted on the stand placed within the test chamber, in such a manner, that they are not shielded from the flame by the support. The precise orientation of the deflection coil units relative to the flame, if not stated in the relevant specifications, shall be that judged to be the most unfavourable or which presents maximum surface to the test flame.

B-3.2 The height of the deflection coil units shall be so adjusted that the lowest part of the component body is 51 mm from the top of the burner as shown in Fig. 5.

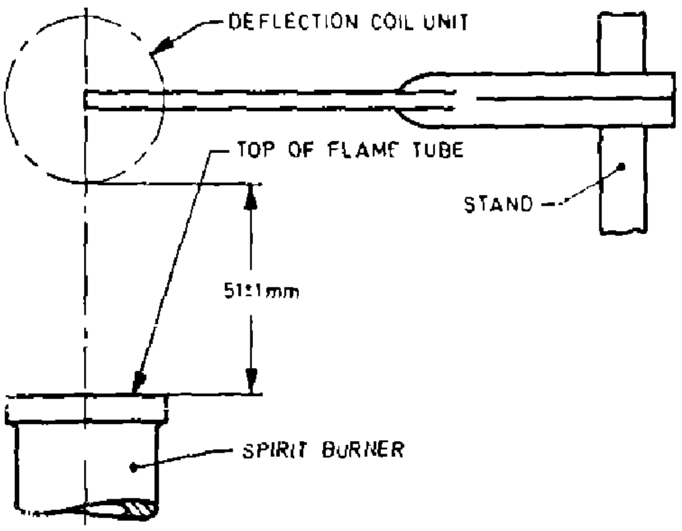


FIG. 5 RELATIVE POSITION OF BURNER AND COMPONENT

B-4. TESTING

B-4.1 After confirming that the flame is satisfactory as specified in **B-2.1**(c), the burner shall be placed underneath the deflection coil unit in such a manner that they are enveloped by the flame. The deflection coil unit shall be exposed to the flame for either 1 minute or any less time necessary to cause ignition.

B-4.2 If ignition has occurred, it shall not continue for more than 15 seconds or any other period specified in the relevant specification after withdrawal of the flame.

B-5. REQUIREMENT

B-5.1 Burning particles shall not detach from the deflection coil units.

INDIAN STANDARDS

ON

TRANSFORMERS AND INDUCTORS FOR ELECTRONIC EQUIPMENT

IS:

1512-1969 Tests and general requirements for IF transformers and RF coils (*first revision*)

6297 (Part I)-1971 Transformers and inductors (power, audio, pulse and switching) for electronic equipment · Part I General requirements and tests

6297 (Part II)-1973 Transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part II Power transformers

6297 (Part III)-1974 Transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part III Audio, frequency transformers and chokes

6297 (Part IV)-1974 Transformers and inductors (power, audio, pulse and switching) for electronic equipment: Part IV Pulse and switching transformers

8201-1976 High frequency wide-band matching transformers

9187 (Part I)-1979 Deflection coil units used with TV picture tubes: Part I General requirements and tests

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg. m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION
Manak Bhavan 9 Bahadur Shah Zafar Marg NEW DELHI 110002
Telephones : 27 01 31, 26 60 21 **Telegrams : Manaksanstha**

Regional Offices :

		Telephone
Western : Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern : 5 Chowringhee Approach	CALCUTTA 700072	23-08 02
Southern : C.I.T. Campus, Adyar	MADRAS 600020	41 24 42

Branch Offices :

'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Gangotri Complex, Bhadbhada Road, T.T. Nagar	BHOPAL 462003	6 27 16
22E Kalpana Area	BHUBANESHWAR 751014	5 36 27
Ahimsa Bldg, SCO 82-83, Sector 17C	CHANDIGARH 160017	2 83 20
5-8-56/57 L. N. Gupta Marg	HYDERABAD 500001	22 10 83
D-277 Todarmal Marg, Banipark	JAIPUR 302006	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	8 12 72
Patliputra Industrial Estate	PATNA 800004	5 36 55
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27

Printed at Delhi Printers, New Delhi, India